EXHIBIT 1

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(54) **PERSONAL AREA NETWORKS**

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Publication Classification

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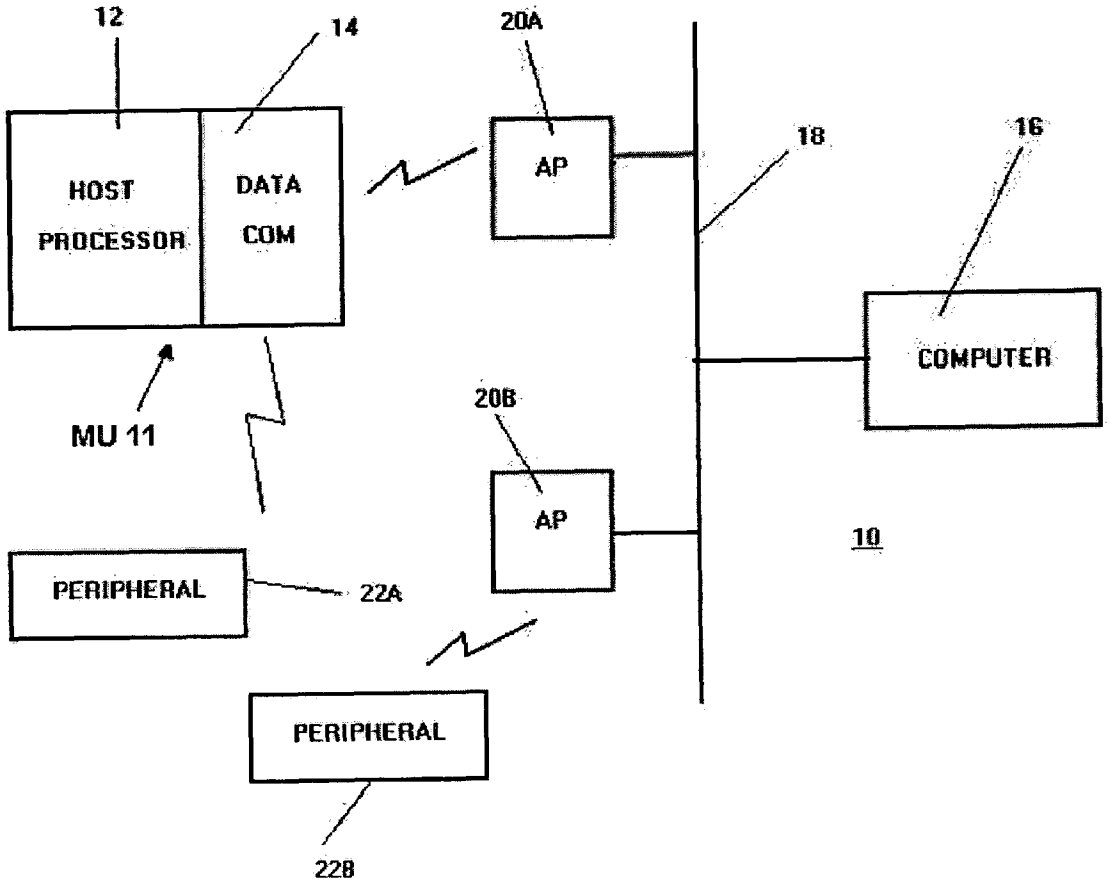
(57) **ABSTRACT**

A system is provided with mobile units that are arranged to conduct wireless data communications with access points following a first protocol, such as IEEE standard 802.11. The mobile units are further arranged for modified protocol communications with peripheral devices that permanently associate with a mobile unit.



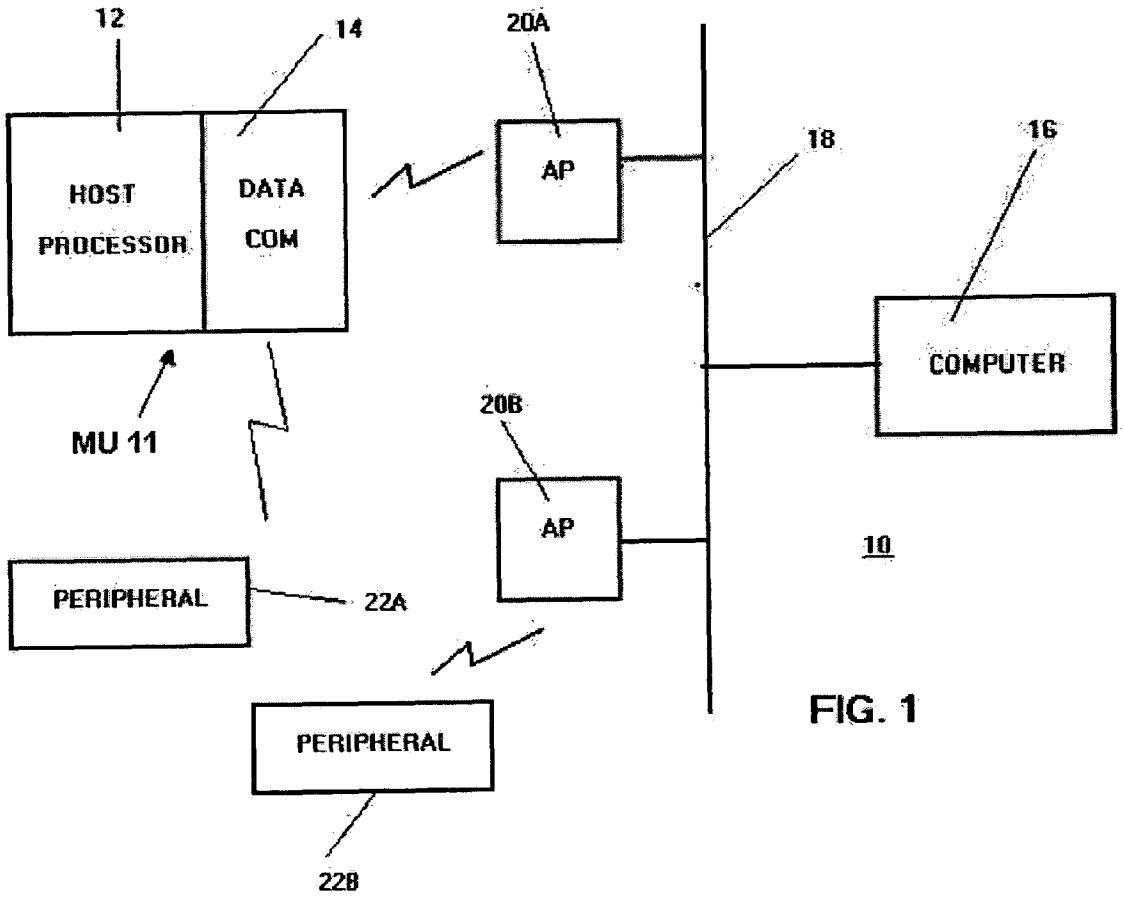

12
14
20A
HOST PROCESSOR
DATA COM
AP
18
16
COMPUTER
MU 11
20B
AP
10
PERIPHERAL
22A
PERIPHERAL
22B

FIG. 1

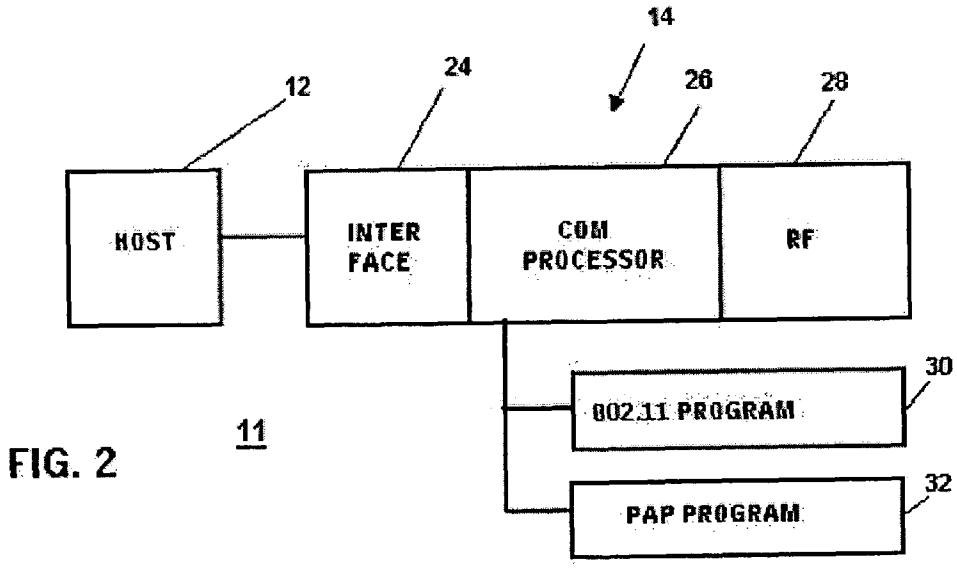

14
12
24
26
28
HOST
INTER FACE
COM PROCESSOR
RF
30
802.11 PROGRAM
32
PAP PROGRAM
11

FIG. 2

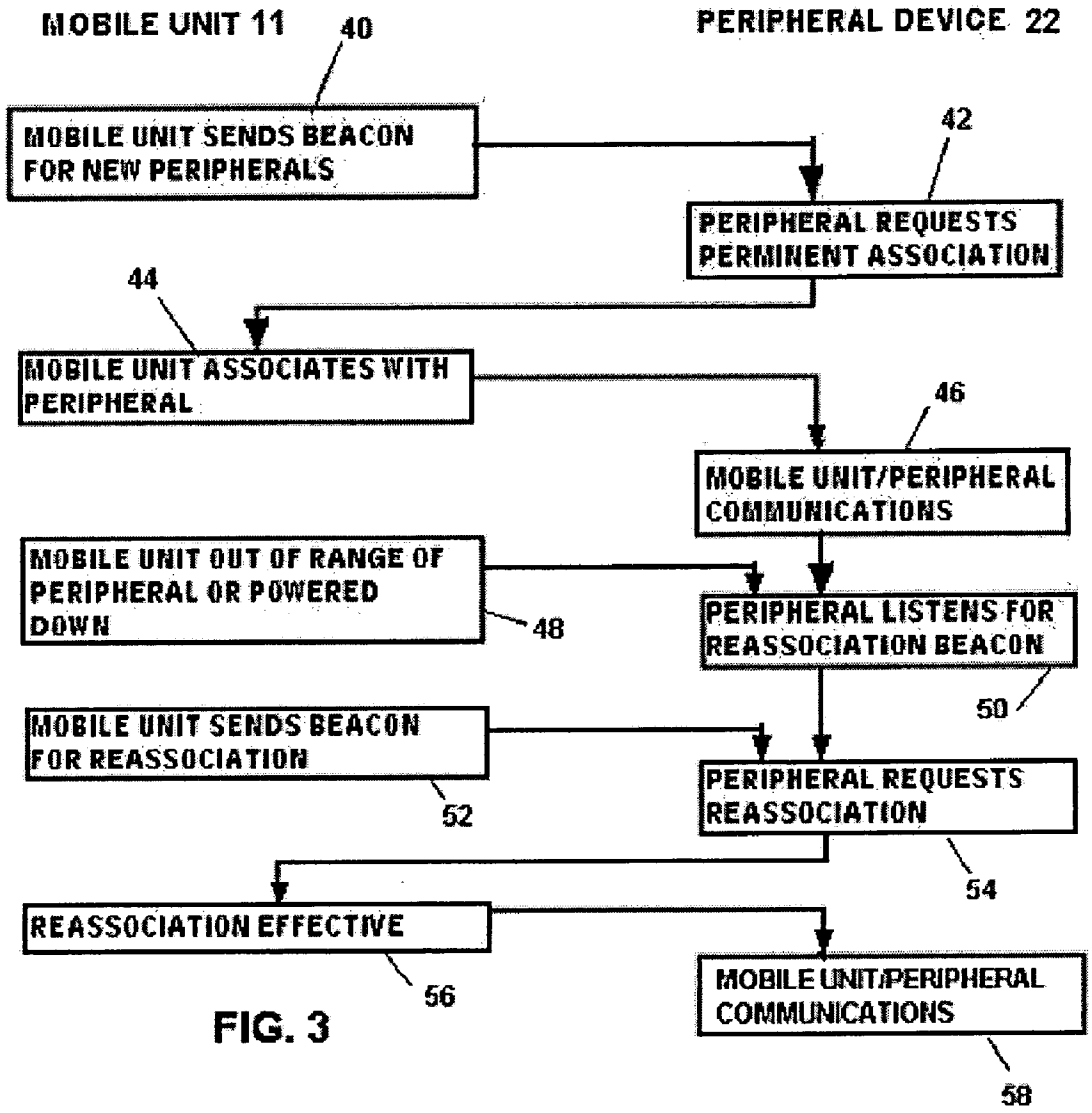

MOBILE UNIT 11
PERIPHERAL DEVICE 22
40
MOBILE UNIT SENDS BEACON FOR NEW PERIPHERALS
42
PERIPHERAL REQUESTS PERMINENT ASSOCIATION
44
MOBILE UNIT ASSOCIATES WITH PERIPHERAL
46
MOBILE UNIT/PERIPHERAL COMMUNICATIONS
MOBILE UNIT OUT OF RANGE OF PERIPHERAL OR POWERED DOWN
48
PERIPHERAL LISTENS FOR REASSOCIATION BEACON
50
MOBILE UNIT SENDS BEACON FOR REASSOCIATION
52
PERIPHERAL REQUESTS REASSOCIATION
54
REASSOCIATION EFFECTIVE
56
MOBILE UNIT/PERIPHERAL COMMUNICATIONS
58

FIG. 3

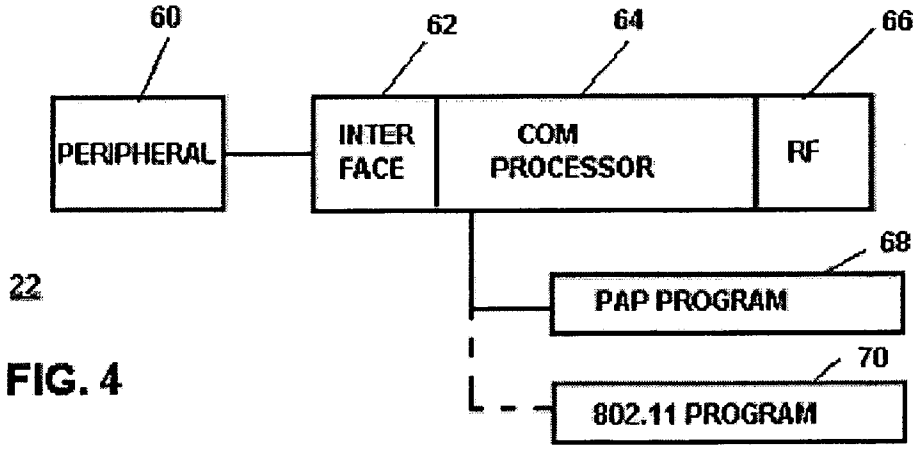

60
62
64
66
PERIPHERAL
INTER FACE
COM PROCESSOR
RF
22
68
PAP PROGRAM
70
802.11 PROGRAM

FIG. 4

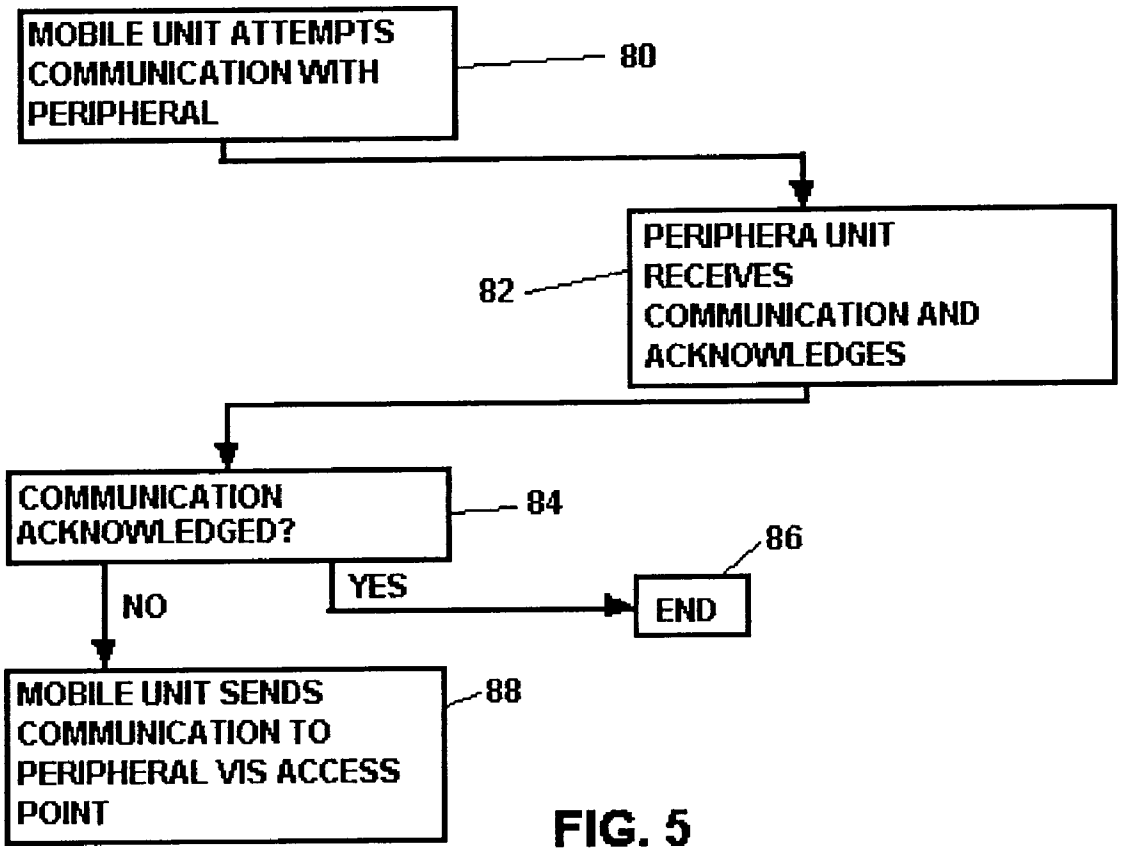

MOBILE UNIT ATTEMPTS COMMUNICATION WITH PERIPHERAL
80
PERIPHERA UNIT RECEIVES COMMUNICATION AND ACKNOWLEDGES
82
COMMUNICATION ACKNOWLEDGED?
84
YES
86
END
NO
MOBILE UNIT SENDS COMMUNICATION TO PERIPHERAL VIS ACCESS POINT
88

FIG. 5

PERSONAL AREA NETWORKS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. provisional patent application No. 60/406,531, filed on Aug. 28, 2002.

BACKGROUND OF THE INVENTION

[0002] This invention relates to wireless data communications systems and in particular relates to a system for providing communications between a mobile unit (MU) and an one or more access points (AP) of a network and also for providing data communications between a mobile unit and a peripheral device.

[0003] There are currently two models for short to moderate distance wireless data communications. Wireless local area networks, such as specified by IEEE specification 802.11, are essentially extensions of a wired local area network. In such systems there are access points that bridge packets between the wired and wireless networks. Mobile units have network interface cards (NIC's), frequently as a plug in device, to provide communications to the local area network via an access point. The network interface card may be PCMCIA cards, compact flash cards or integrated hardware located within the mobile unit. The network interface card and access point communicate with each other in order to move data packets between the wired network and the mobile unit.

[0004] Another form of wireless data communications is the personal area network, such as specified by IEEE standard 802.15/Bluetooth. Such networks are typically very short range, such as a few meters, and are used primarily for communications between a wireless peripheral device and a mobile unit, such as a mobile computer. In accordance with the Bluetooth system one unit functions as a master device and the other as a slave device. The master is usually a mobile unit, such as PDA or a notebook computer, while the slaves may be peripheral type devices, such as a printer, keyboard, mouse, scanner, etc.

[0005] Using existing technology, wireless local area networks (WLANs) are typically based on a standard such as IEEE 802.11, wherein mobile units become associated with access points and communicate with a wired network or a computer located on the wired network via the access point. The term "network" is intended to mean at least one computer connected for data communications to at least one access point. Personal area networks (PANs) on the other hand are usually based on a master/slave protocol, such as the Bluetooth protocol.

[0006] When it is desired to have a mobile unit communicate with both a wired network and a peripheral device, two distinct radios are required. The requirement for two radio systems adds cost and reduces the performance of both networks. It is known that the 802.11 and Bluetooth systems can interfere with each other, a fact that can only be partially compensated by using various "co-existence" algorithms. In addition, the use of two radios adds to the complexity, weight, and power requirements of a mobile unit.

[0007] As used in this application the term "Access point" is intended to include equivalent arrangements, such as that disclosed in copending application Ser. No. 09/528,697, filed Mar. 17, 2000, the specification of which is incorporated herein by reference, and is owned by the assignee of this application. As described in that application conventional 802.11 Access Points are replaced with a combination of an RF port and a cell controller, and wherein certain MAC functions of conventional access points are performed in the cell controller.

[0008] It is an object of the present invention to provide a method for data communications and an apparatus which provides both WLAN and PAN services using a single radio for both functions.

SUMMARY OF THE INVENTION

[0009] In accordance with the invention there is provided a method for wireless data communications between a mobile unit and an access point of a network and between the mobile unit and at least one peripheral device. The mobile unit is provided with a data communications device that includes an interface to a host processor of the mobile unit, a data communications digital processor, including a control program and a radio transmitter and receiver. The data communications device is operated in a first WLAN mode to associate with the access point and engage in data communications with the network via the access point using the first communications protocol. The data communications device is operated in a second personal area communications mode, wherein the data communications device communicates with the peripheral device using a modification of the first data communications protocol. The second mode includes operating the data communications device as a master device and permanently associating with at least one peripheral device.

[0010] In a preferred arrangement of the method, the data communications device is operated in the second mode with a radio transmitter power at a selected power level that is lower than the power level used for operating in the first data communications mode. The control program is preferably arranged to operate the data communications device in the first and second modes. In the second mode the data communications device may be operated to reassociate with the peripheral device. The data communications device may include a power saving operational mode wherein the device is inactive for selected periods of time. In such case the control programs includes instructions to cause the data communications device to synchronize the selected periods of time with the peripheral device.

[0011] In accordance with the invention there is provided a system for providing wireless data communications. The system includes at least one access point connected to at least one computer for providing wireless data communications between the computer and at least one mobile unit. The access point acts as a master device using a first data communications protocol to receive association requests from mobile units and to form one or more associations with mobile units for data communication therewith. At least one mobile unit is provided including a host processor and a first data communications device. The data communications device includes a first data communications digital processor having a first control program and a first radio for sending and receiving data. At least one peripheral device is provided including a second data communications device. The second

data communications device includes a second data communications digital processor having a second control program and a second radio. The first control program is arranged to send association requests to access points according to the first communications protocol using the first radio and to provide data communications to and from the computer by at least one access point connected thereto. The first control program includes an initiating program wherein the first data communications device receives initiation requests from the second data communications device and forms a permanent association therewith using a modification of the first data communications protocol.

[0012] In a preferred arrangement the first control program includes a first reassociation program whereby the first communications device receives reassociation requests from said at least one peripheral device permanently associated therewith and wherein the first communication device thereafter engages in data communications with the at least one peripheral device. The first reassociation program may be operative when the mobile unit is powered up and where the at least one peripheral device has previously become permanently associated with the first communications device. The second control program may include a second reassociation program wherein the second reassociation program is operative to cause the second data communications device to send reassociation requests when the at least one peripheral device is powered up.

[0013] In a preferred arrangement the second control program includes a network communications program to cause the at least one peripheral device to become associated with an access point connected to a network including the at least one computer and to engage in data communications using the first communications protocol. In this arrangement the first control program may be arranged to cause the first data communication device to communicate directly with the peripheral device when the first communications device is in direct communications with the second communications device and to communicate with the second communications device via the network when the first communications device is not in direct communication with the second communications device. The second communications device may include a radio transmitter arranged to transmit at a first higher power level when communicating with an access point using the first data communications protocol and to transmit at a second lower power level when communicating directly with an associated mobile unit. Likewise, the first data communications device may include a radio transmitter arranged to transmit at a first higher power level when communicating with the at least one access point using the first data communications protocol and to transmit at a second lower power level when communicating directly with an associated peripheral device.

[0014] In accordance with the invention there is provided a mobile unit that includes a host processor and a data communications device. The data communications device includes a data communications digital processor having a control program and a radio for sending and receiving data. The control program is arranged to send association requests to an access point according to a first data communications protocol using the radio and to provide data communications to and from a computer via an access point connected thereto. The control program further includes an initiating program whereby the data communications device receives an initiation request from a peripheral device and forms a permanent association therewith using a modification of the first communications protocol.

[0015] The mobile unit preferably includes a reassociation program whereby the communications device receives a reassociation request from a peripheral device permanently associated therewith and whereby the first communications device thereafter engages in data communications with the peripheral device. The reassociation program may be operative when the mobile unit is powered up.

[0016] In accordance with the invention there is provided a peripheral device including a data communications device. The data communications device includes a data communications digital processor having a control program and a radio. The control program is arranged to cause the data communications device to be permanently associated with a data communications device on a mobile unit and conduct data communications therewith.

[0017] In a preferred arrangement of the peripheral device, the control program is further arranged to cause the communications device to send reassociation requests and to reassociate with a mobile unit communications device. The control program may be arranged to cause the communications device to permanently associate with the mobile unit communications device upon initial operation thereof and to send reassociation request upon subsequent power up of the peripheral device. The peripheral device control program may be arranged to send reassociation requests when it fails to receive data communication signals from the mobile unit. The peripheral device control program may be further arranged to cause the communications device to associate with an access point of a network.

[0018] For a better understanding of the present invention, together with other and further objects, reference is made to the following description, taken in conjunction with the accompanying drawings, and its scope will be pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] **FIG. 1** is a block diagram illustrating a system in accordance with the present invention.

[0020] **FIG. 2** is a block diagram of a mobile unit usable in the system of **FIG. 1**.

[0021] **FIG. 3** is a flow diagram illustrating a process in accordance with the present invention.

[0022] **FIG. 4** is a block diagram illustrating a peripheral device in accordance with the present invention.

[0023] **FIG. 5** is flow diagram illustrating a further process in accordance with the present invention.

DESCRIPTION OF THE INVENTION

[0024] Referring to **FIG. 1** there is shown a block diagram of a system **10** in accordance with the present invention for providing wireless data communications. The system **10** illustrated in **FIG. 1** includes a wired network **18**, such as a local area network, which includes at least one computer **16** and one or more access points **20**. The system illustrated in **FIG. 1** includes access points **20**A and **20**B. In the local area network **18** illustrated in **FIG. 1** additional elements may be

included, such as an internet portal, peripheral devices, and a telephone interface, all of which are not illustrated. Those skilled in the art will recognize that rather than using self-contained access points **20**A and **20**B as shown in **FIG. 1** the system may use a cell controller and RF ports as a substitute for one or more access points following the teachings of the commonly owned co-pending application Ser. No. 09/528,697, filed Mar. 17, 2000. In connection with the description of the present invention, it should be understood that the term access points includes self-contained access points following a specified protocol for wireless communications, such as IEEE standard 802.11 or the equivalent following the same or a similar standard, such as the combination of RF ports and cell controllers as described in the co-pending application.

[**0025**] The system **10** of the present invention includes a mobile unit **11** that includes a host processor **12** and a data communications device **14** interfaced to the host processor **12**. Data communications device **14** may, for example, be a network interfaced controller (NIC) card, or similar component, which is part of mobile unit **11**. The mobile unit **11**, including its host processor **12** and data communications device **14** may, for example, take the form of a personal digital assistant (PDA), network telephone, or laptop computer equipment for wireless data communications. The system **10** of **FIG. 1** further includes peripheral devices **22**A and **22**B. It will be recognized by those skilled in the art that the peripheral devices **22** may include such devices as a wireless mouse, a memory device, such as a CD ROM reading device, a printer, a removable disk memory, a keyboard or other peripheral device connected to mobile unit **11** by a wireless data communications link.

[**0026**] One example of a system in accordance with the present invention may be a system for use in a retail establishment. For example, mobile unit **11** may be a PDA type device carried by a sales associate. Using the host processor **12** and data communications device **14** of the mobile unit **11** a sales person can communicate via an access point **20**A with the computer **16** over the wired network **18** of the retail establishment in order to obtain information for a customer, such as availability of colors and delivery dates. Additionally using an interface of the network **18** the sales person may be able to communicate beyond local area network **18**, for example, to obtain credit information on a customer or to obtain detailed information concerning a product that the customer is interested in, for example via the internet.

[**0027**] In connection with completing a sales transaction it may be desirable that mobile unit **11** communicate with peripheral devices **22**A, **22**B for purposes of completing a sales transaction. For example one interface device **22** may be a keyboard through which sales information concerning a product may be entered. Alternatively, one peripheral device may be a bar code reader for reading a product identification bar code from a floor sample of the product. Additional peripheral devices that may be used in a retail environment may include, for example, a credit card magnetic stripe reader, a data display or a printer for printing a sales receipt.

[**0028**] As described above, prior to the present invention, separate data communication devices has been used to communicate data from a mobile unit **11** to a wired local area network **18** by an access point using a protocol such as IEEE 802.11. In addition, prior devices have used standard 802.15/Bluetooth for communication with peripheral devices **22**. The present invention provides a single data communications device **14** for use in mobile unit **11** and coordinated with the arrangement of the system **10** and peripheral devices **22** to use similar wireless data communications protocols for communications both with access points **20** and peripheral devices **22**. The arrangement of the present invention achieves both types of communications by a selection of embedded software in the processor of data communications device **14** of the mobile unit **11** and the data communications device **64** in peripheral device **22**. The wireless local area network that includes access point **20**, local area network **18** and computer **16** operates according to an established standard, such as IEEE 802.11 for communications with mobile unit **11**. Communications between mobile unit **11** and peripheral devices **22** preferably use a modification of that standard which is achieved by a modification of the software in the mobile unit **11** communications processor and by provision of special software in the communication processors of peripheral devices **22**, as will be further described.

[**0029**] The inventors of the present invention have given consideration to the communications protocol requirements of the system **10**. These are the communications between mobile unit **11** and access points **20** and communications between mobile unit **11** and peripheral devices **22**. Communications with the access points, for example, following standard 802.11 include the function of roaming whereby, when a mobile unit moves from an area within range of communication with a first access point **20**A to another area within range of another access point **20**B, the roaming function of standard 802.11 causes mobile unit **11** to reassociate with a different access point **20** for further data communications. In connection with communications with peripheral devices **22**, such as the communications provided by the Bluetooth system, the devices are required to communicate over only a very short range, for example 10 meters or less. Usually it is assumed that the peripheral devices are within such range of the mobile unit, and accordingly the roaming and association functions of standard 802.11 are not required. Applying these protocol requirements, the inventors have discovered that a modified communications protocol similar to standard 802.11 can be used for providing short-range communications between mobile unit **11** and peripheral devices **22**. The particular characteristics of this modified 802.11 standard include a permanent or quasi-permanent association between the peripheral device **22** acting as a mobile unit and the mobile unit **11** acting as an access point for the peripheral devices. Accordingly, if the mobile unit is out of range of the peripheral devices for data communications in either direction the peripheral devices do not seek to associate with a different mobile unit, but await the opportunity to reacquire their association with the mobile unit with which they are permanently associated.

[**0030**] The term "permanent association" is intended to mean an association that is relatively long term or that requires positive action by the operator to change. Typically a peripheral device, such as a keyboard may be used with only a single mobile unit. If a new or replacement mobile unit is put into operation, a new "permanent association" may be established by the operator, for example, by a

specially addressed command to re-establish the association. The permanent association is intended to survive power-down of either unit or movement of the units out of range of each other.

[0031] Following the model upon which the present invention is based, when initially activated or when initially configured, a semi-permanent association takes place whereby the peripheral devices become associated with the data communications device in a particular mobile unit, which is acting as an access point or master unit for purposes of the modified 802.11 protocol. In addition, the roaming feature of the peripheral device, by which it may tend to seek association with a different unit it is not active.

[0032] A feature of the present invention is that when the mobile unit is powered down, the peripheral devices remain in a state by which they continue to seek the permanently associated mobile unit for a reassociation function to renew the permanent association previously initiated. Likewise when the peripheral devices are powered down and then repowered they will seek a reassociation with the same mobile unit with which they had been previously associated.

[0033] Another feature of the system **10** in accordance with the present invention is that since the peripheral devices need only engage in short range data communications with the mobile unit **11**, such as 10 meters or less, the transmitter power of the peripheral devices **22** and the mobile unit data communications device **14**, when communicating with each other, need not have the same transmitter power level as the mobile unit uses in connection with potentially longer range communications with access points **20**, which may typically be spaced apart by a distance larger than 10 meters, for example 30 or 40 meters. Accordingly when operating in the mode for communication with peripheral devices **22**, the data communications device **14** of mobile unit **40** will use a lower transmitter power. Likewise, a lower transmitter power will be used by the communications devices of peripheral devices **22** when communicating with mobile unit **11**. Such lower power operation may be provided, for example, by not using the transmitter power amplifier stage.

[0034] Optionally peripheral devices **22** may also be arranged to communicate with the local area network **18** through a separate association, for example between access point **20**B and peripheral device **22**B. Accordingly, it is an optional feature of the invention that when mobile unit **11** is not within range for direct communication with peripheral device **22**B it may send (or receive) a data message to peripheral device **22**B via access point **20**A, network **18** and access point **20**B with which peripheral device **22**B is associated.

[0035] Referring to **FIG. 2** there is shown a block diagram of an exemplary embodiment of a mobile unit in accordance with the present invention. The mobile unit **11** includes a host processor **12**, which may, for example, be the host processor of a laptop computer, a PDA, or even a host processor for a telephone communication set. The host processor **12** is conventionally interfaced by interface circuitry **24** to a data communications device **14**.

[0036] Data communications device **14** further includes a communications processor **26**, which may be a programmed microprocessor or a digital signal processor, and an RF unit **28**, which may include baseband processing for signals, transmitter, receiver and antenna and associated circuitry for RF data communications. Such devices are well known in the art and available from a number of vendors. The communications processor **26** includes alternate programs **30** and **32**. Program **30** is a conventional 802.11 standard program for formatting and communicating data using standard 802.11 via the RF circuit **28**. Program **32** is a personal access point (PAP) program for operating the communications device **14** as a personal communications access point for 802.11-like communications with peripheral devices **22**.

[0037] When the mobile unit **11** operates as a peripheral attachment point for communication with peripheral devices **22**, the communications processor **26** interfaces with the operating systems of the host **12** as a peripheral connection, such as USB. The communications device **14** becomes "a master" device for one or more peripherals. For communications with access points **20** the communications device **14** acts as a client device.

[0038] The peripheral attachment point software **32** has some changes from the standard 802.11 protocol. The first change is that the association of a peripheral device to the communications device **14** of a mobile unit is a long-term association that survives the absence or power down of either device. The peripheral devices accordingly do not undertake the conventional roaming function typical of standard 802.11 protocol. Reassociation of a peripheral device with another mobile unit requires an individual and special reconfiguration of the unit to do another long-term or quasi-permanent association. When either the mobile unit **11** or peripheral device **22** is powered down or becomes out of range for communication it becomes necessary to perform what is termed a reassociation function. For this purpose the mobile unit, acting as a peripheral access point may provide a beacon from which the peripheral device can determine that it is within communication range of the mobile unit with which it has a long-term association and the peripheral device can thereafter reassociate itself with the same mobile unit with which it had been previously associated.

[0039] Referring to **FIG. 3** there is a shown a flow diagram of a process by which association and reassociation may take place between a peripheral unit **22** and a mobile unit **11**. Initially mobile unit **11** may be caused to send a beacon to determine if there are any new peripherals seeking association with the mobile unit, which is shown at step **40** of **FIG. 3**. At step **42** a peripheral unit may request a permanent (i.e., long-term) association. At step **44** the mobile unit associates with the peripheral and thereafter at step **46** carries on data communications with the peripheral, for example, sending data to be printed by a peripheral unit that is a printer.

[0040] At step **48** the mobile unit may determine that it is out of range from the peripheral or that it is powered down. At step **50** the peripheral determines that it no longer has reliable data communications with the mobile unit with which it is long-term associated and thereafter the peripheral periodically listens for a reassociation beacon from the mobile unit. At step **52**, representing the condition where the mobile unit has moved within range of the peripheral, or has been powered up again after being turned off, the mobile unit sends a beacon seeking reassociation with the peripheral. At step **54** the peripheral requests reassociation, which is affected by the mobile unit at step **56** whereby mobile unit/peripheral communications again take place at step **58**.

[0041] Referring to **FIG. 4** there is shown a block diagram of an exemplary arrangement for a peripheral device in accordance with the invention. The peripheral device **22** includes peripheral element **60**, such as a printer, a bar code scanner or the like. Such devices may or may not include their own host processor according to the function of the device. The peripheral unit **60** is interfaced by interface circuit **62** to a communications processor **64** and an RF unit **66**. The interface **62**, communications processor **64** and RF unit **66** are otherwise similar to the devices of the communications device **14** shown in **FIG. 11**. As noted above, the RF unit may operate at a lower power level than usually used for 802.11 protocol communications because of the short range involved.

[0042] The communications device of the peripheral device includes the PAP program **68** which interfaces with PAP program **32** of the communications processor **26** of the mobile unit **11**. Optionally, as will be described below, peripheral device **22** may include an 802.11 program **70** for separate communications between peripheral device and an access point **20** of the network **18**.

[0043] One possible process for the use of direct communications between a peripheral device **22** and an access point **20** of network **18** is shown in **FIG. 5**. In the method shown in **FIG. 5**, the mobile unit may attempt communications with a peripheral device at step **80**. At step **82**, assuming the peripheral device is within range of the mobile unit, the peripheral unit receives the communication and acknowledges the communication. At step **84** the mobile unit determines whether or not the communications have been acknowledged. This determination may be made after one or more repeated attempts for direct communication between the mobile unit **11** and the peripheral device **22**. If the communication has been successful the process ends at step **86**. If the communication has not been successful, for example because the peripheral device is out of range, the mobile unit may send a communication to the peripheral device via an access point **20** and through the network **18** at step **88**. Accordingly the operator of a mobile unit, such as a computer, can cause an associated printer to print a file even if the mobile unit is outside of the personal access point communication range with the peripheral device.

[0044] One feature of the present invention is a facilitated security model. The association between the peripheral device and the mobile unit is long-term and does not involve roaming. Accordingly the peripheral device and the mobile unit, using their data communications processors, can exchange secret information that is stored on both devices. This information can be used for encryption and/or authentication purpose.

[0045] An additional optional feature of the invention is that the PAP software in the Mobile Unit **11**, the peripheral device **22** or both may implement the PSP power save mode of operation. In this instance, the Mobile Unit, as master device for the PAP communications with the peripheral device would synchronize its "sleep mode" and "wake-up" time with the peripheral device.

[0046] It should be recognized that in some arrangements it may be desirable for a peripheral device to operate with more than one mobile unit. In this case the PAP software of the peripheral device may operate as multiple "virtual" peripheral devices, each with its own protocol access address and each associated on a long term basis with the PAP software of a different mobile unit.

[0047] While there have been described various embodiments of the invention, those skilled in the art will recognize that other changes and modifications may be made thereto without departing from the spirit of the invention, and it is intended to claim all such changes and modifications as fall within the true scope of the invention.

I claim:

1. A method for providing wireless data communications between a mobile unit and an access point of a network and between said mobile unit and at least one peripheral device, comprising:

providing said mobile unit with a data communications device, said device including an interface to a host processor of said mobile unit, a data communications digital processor, including a control program and a radio transmitter and receiver;

operating said data communications device in a first WLAN mode to associate with said access point and engage in data communications with said network via said access point;

operating said data communications device in a second personal area communications mode, wherein said data communications device communicates with said at least one peripheral device.

2. A method as specified in claim 1 wherein said data communications device operating in said first WLAN mode uses a first communications protocol and said data communications device operating in said second personal area communications mode communicates with said at least one peripheral device using a modification of said first communications protocol.

3. A method as specified in claim 1 wherein said second mode includes operating said data communications device as a master device and permanently associating with said at least one peripheral device.

4. A method as specified in claim 1 wherein operating said data communications device in said second mode includes operating said radio transmitter at a selected power level lower than a power level used for operating in said first data communications mode.

5. A method as specified in claim 1 further wherein said control program is arranged to operate said data communications device in said first and said second modes.

6. A method as specified in claim 1 wherein operating said data communications device in said second mode includes re-associating with said at least one peripheral device.

7. A method as specified in claim 1 wherein said data communication device includes a power saving operational mode wherein said device is inactive for selected periods of time and wherein said control program includes instructions to cause said data communications device to synchronize said selected periods of time with said peripheral device.

8. A system for providing wireless data communications, comprising:

at least one access point connected to at least one computer for providing wireless data communications between said at least one computer and at least one mobile unit, said access point using a first data communications protocol to receive association requests

from mobile units and to form one or more associations with mobile units for data communications therewith;

at least one mobile unit including a host processor and a first data communications device, said first data communications device including a first data communications digital processor having a first control program and a first radio for sending and receiving data;

at least one peripheral device including a second data communications device, said second data communications device including a second data communications digital processor having a second control program and a second radio;

wherein said first control program is arranged to send association requests to access points using said first radio and to provide data communications to and from said computer via at least one access point connected thereto.

9. A system as specified in claim 8 wherein said access point acts as a master device and permanently associates with said at least one peripheral device.

10. A system as specified in claim 8 wherein said first control program includes an initiating program whereby said first data communication device receives initiation requests from said second data communications device and forms a permanent association therewith using a modification of said first communication protocol.

11. A system as specified in claim 8 wherein said first control program includes a first reassociation program whereby said first communication device receives reassociation requests from said at least one peripheral device permanently associated therewith, and whereby said first communication device thereafter engages in data communications with said at least one peripheral device.

12. A system as specified in claim 11 wherein said first reassociation program is operative when said mobile unit is powered up and wherein said at least one peripheral device has previously become permanently associated with said first communication device.

13. A system as specified in claim 11 wherein said second control program includes a second reassociation program, and wherein said second reassociation program is operative to cause said second data communications device to send reassociation requests when said at least one peripheral device is powered up and wherein said at least one peripheral device has previously become permanently associated with said first communication device.

14. A system as specified in claim 8, wherein said second control program includes a network communication program to cause said at least one peripheral device to become associated with an access point connected to a network including said at least one computer and to engage in data communications using said first communications protocol.

15. A system as specified in claim 14 wherein said first control program is arranged to cause said first data communications device to communicate directly to said peripheral device when said first communications device is in direct communication with said second communication device and to communicate with said second communication device via said network when said first communication device is not in direct communication with said second communication device.

16. A system as specified in claim 14 wherein said second data communications device includes a radio transmitter arranged to transmit at a first higher power level when communicating with an access point and at a second lower power level when communicating directly with an associated mobile unit.

17. A system as specified in claim 11 wherein said first data communications device includes a radio transmitter arranged to transmit at a first higher power level when communicating with said at least one access point using said first data communications protocol and to transmit at a second lower power level when communicating directly with an associated peripheral device.

18. A mobile unit including a host processor and a data communications device, said data communications device including a data communications digital processor having a control program and a radio for sending and receiving data, wherein said control program is arranged to send association requests to access points according to a first data communications protocol using said radio and to provide data communications to and from a computer via at least one access point connected thereto, and wherein said control program includes an initiating program whereby said data communication device receives initiation requests from a peripheral device and forms a permanent association therewith using a modification of said first data communication protocol.

19. A mobile unit as specified in claim 18 wherein said control program includes a reassociation program whereby said communication device receives reassociation requests from said peripheral device permanently associated therewith, and whereby said first communication device thereafter engages in data communications with said peripheral device.

20. A mobile unit as specified in claim 19 wherein said reassociation program is operative when said mobile unit is powered up.

21. A peripheral device including a data communications device, said data communications device including a data communications digital processor having a control program and a radio, wherein said control program is arranged to cause said data communications device to permanently associate with a data communications device on a mobile unit and conduct data communications therewith.

22. A peripheral device as specified in claim 21 wherein said control program is further arranged to cause said communications device to send reassociation requests and to reassociate with said mobile unit communications device.

23. A peripheral device as specified in claim 22 wherein said control program is arranged to cause said communications device to permanently associate with said mobile unit communications device upon initial operation and to send said reassociation requests upon subsequent power-up of said peripheral device.

24. A peripheral device as specified in claim 23 wherein said control program is arranged to send said reassociation requests in response to a beam signal from said mobile unit after it fails to receive data communications signals from said mobile unit.

25. A peripheral device as specified in claim 21 wherein said control program is further arranged to cause said communication device to associate with an access point of a network.

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